

REMARKS

Upon entry of this amendment, claims 1-22 will be pending in this application, of which claims 1, 11, and 17-22 are being amended.

Claims 1 (already allowed), 18, and 19-22 (rejected as being dependent upon a rejected base claim), are being amended for various cosmetic reasons.

The amendments to independent claims 1, 11, 17 and 19, are fully supported by the originally filed specification and original claims and add no new matter. Entry of the amendments and reconsideration of the present case is respectfully requested.

Claims 23-25 are being canceled without prejudice as drawn to a non-elected invention.

Allowed Claims

Applicant thanks the Examiner for indicating that claims 1-10 are being allowed.

The Examiner also indicated that claims 19-22 were objected to as dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim. However, claim 19 is an independent claim and not a dependent claim, thus, claim 19-22 should be allowable in their present form.

Rejection Under 35 U.S.C. 102(b)

The Examiner rejected claims 17 and 18 under 35 U.S.C. 102(b) as being anticipated by Pevere et al. (U.S. Patent no. 2,857,002) (see figure 1) or Bielstein et al. (U.S. Patent no. 3,386,508) (see figures 1 and 2) or Wright (U.S. Patent no. 1,520,737 (see figures 1-3) or Goodhart (U.S. Patent no. 4,646,836) (see figures 2A, 12 and 13).

As amended, claim 17 is a method of recovering hydrocarbons from a subterranean reservoir comprising drilling an injection well bore and a production well bore into the subterranean reservoir, the injection well bore having an outlet spaced apart from an inlet of the production well bore. A permeable zone is formed comprising (i) a first patterned web of channels radiating outwardly from the outlet of the injection well bore, the channels extending downwardly into the subterranean reservoir at an angle of at least about 5 degrees, and (ii) a second patterned web of channels radiating outwardly from the inlet of the production well bore and located below, or connected to, the first patterned web of channels. A heated fluid is flowed into the permeable zone to mobilize hydrocarbons in the subterranean reservoir so that the mobilized hydrocarbons flow toward the inlet of the production well bore.

Pevere et al. teaches a drilled shaft 11 with pilings extending therefrom and with a production tubing 16 in the shaft 11. (Column 2, lines 15-30.) Pevere et al. does not teach forming a permeable zone comprising (i) a first patterned web of channels radiating outwardly from an outlet of an injection well bore, the channels extending downwardly into the subterranean reservoir at an angle of at least about 5 degrees, and (ii) a second patterned web of channels radiating outwardly from an inlet of a production well bore and located below, or connected to, the first patterned web of channels. Instead, Pevere et al. only teaches pilings extending from a single shaft, and not first and second webs of channels that each extend from a different well bore. Thus, Pevere et al. does not anticipate claim 17 or the claims dependent therefrom.

Bielstein et al. teaches a well bore 12 with a tubing string 19 and additional wells 15, 16, 17 and 18 which are bored around, but connect to, the well bore 12. (Column 3 lines 5-18, and Fig. 1.) However, Bielstein et al. also does not teach forming a permeable zone comprising (i) a first patterned web of channels radiating outwardly from an outlet of an injection well bore, and (ii) a second patterned web of channels radiating outwardly from an inlet of a production well bore and located below, or connected to, the first patterned web of channels. Instead, Bielstein et al. teaches that the wells 15, 16, 17 and 18 are all joined to the well bore 12. Thus, Bielstein et al. also does not anticipate claim 17 or the claims dependent therefrom.

Wright teaches an oil well comprising an aperture 1 to a chamber 2 from which extends upwardly inclined channels 5. (Lines 77-104.) However, Wright also does not teach forming a permeable zone comprising (i) a first patterned web of channels radiating outwardly from an outlet of an injection well bore, and (ii) a second patterned web of channels radiating outwardly from an inlet of a production well bore and located below, or connected to, the first patterned web of channels. Thus, Wright also does not anticipate claim 17 or the claims dependent therefrom.

Goodhart provides several examples, including a well comprising a central shaft 200 having multiple upwardly deviated holes 10D and one or more outer loop boreholes 202 as shown in Fig. 12. (Column 17, lines 35-40.) Goodhart also teaches a vertical shaft 400 connected to upwardly deviated holes 10D and deviated outer boreholes 410 as shown in Fig. 13. (Column 18, lines 52-62.) However, Goodhart does not teach a permeable zone comprising (i) a first patterned web of channels radiating outwardly from an outlet of an injection well bore, the channels extending upwardly into the subterranean reservoir at an angle of at least about 5 degrees, and (ii) a second patterned web of channels radiating outwardly from an inlet of a production well bore and located about the first patterned web of channels. Instead, Goodhart teaches connecting the multiple upwardly deviated holes 10D and outer loop boreholes 202 both to a single central shaft 200; or the upwardly deviated holes 10D and deviated outer boreholes 410 also both to the vertical shaft 400. Thus Goodhart does not teach a first

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patterned web of channels and a second patterned web of channels located below or connected to the first patterned web, and consequently also does not anticipate claim 17 or the claims dependent therefrom.

Thus, Pevere et al., Bielstein et al., Wright, or Goodhart do not anticipate claims 17 and 18.

2. The Office Action also rejected claims 11, 12 and 16 under 35 U.S.C. 102(b) as anticipated by Santourian et al. (U.S. Patent no. 3,199,587) or Hanson et al. (U.S. Patent no. 4,889,186).

Claim 11, as amended, is to a method of recovering hydrocarbons from a subterranean reservoir comprising drilling injection and production well bores into the subterranean reservoir with alternating injection and production well bores disposed at intersection points of a grid pattern. The grid pattern comprises squares with diagonally facing injection wells bores and diagonally facing production wells bores. The injection well bores comprises outlets and the production well bores comprise inlets. A plurality of permeable zones are formed, the permeable zones comprising a first patterned web of channels that radiate outwardly from facing pairs of outlets of the injection well bores in the subterranean region and a second patterned web of channels that radiate outwardly from facing pairs of inlets of the production well bores. Heated fluid is flowed from the outlets into the permeable zones to fluidize hydrocarbons in the subterranean reservoir so that the fluidized hydrocarbons flow toward the inlets of the production well bores.

Santourian et al. teach a flood pattern for producing oil using a well pattern having an even number of wells 12, 14, 16 and 18 that surround a central well 10. Santourian et al. further teaches that "[f]luid is injected through the wells 12 and 14 under substantial pressure and producing thru wells 10, 16, and 18 against back pressure so that by maintaining greater back pressure on well 10 than on wells 16 and 18, break thru of displacing fluid into the producing wells occurs substantially

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simultaneously." (Column 1, lines 11-16, Column 2, lines 30-33, and Fig. 1.) Santourian et al. does not teach a method recovering hydrocarbons from a subterranean reservoir comprising drilling injection well bores comprises outlets and the production well bores comprise inlets, and forming a plurality of permeable zones comprising a first patterned web of channels that radiate outwardly from facing pairs of outlets of the injection well bores in the subterranean region and a second patterned web of channels that radiate outwardly from facing pairs of inlets of the production well bores. Thus Santourian et al. does not anticipate claim 11 or the claims depending therefrom.

Hanson et al. teaches an injection well 30 which is used to form a horizontal injection fracture 38 by applying a fracture fluid 34 at high pressure through an opening 34. The horizontal fracture is a thin crack having an opening between two opposite faces. A similar vertical crack 40 may also form from the pressurized fluid. (Column 4, lines 17-41.) Hanson does not teach a method recovering hydrocarbons from a subterranean reservoir comprising forming a plurality of permeable zones comprising a first patterned web of channels that radiate outwardly from facing pairs of outlets of the injection well bores in the subterranean region and a second patterned web of channels that radiate outwardly from facing pairs of inlets of the production well bores. Hanson et al. does not teach forming patterned webs of channels but instead teaches forming a horizontal or vertical crack. Thus Hanson et al. does not anticipate claim 11 of the claims depending therefrom.

Consequently, neither Santourian et al. nor Hanson et al. anticipate claim 11 or the claims 12 and 16 which are dependent therefrom.

Rejection Under 35 U.S.C. 103(a)

The Examiner rejected claims 17 and 18 under 35 U.S.C. 103(a) as being unpatentable over Yue et al., (U.S. patent no. 6,012,520) or Willman (U.S. patent no. 4,296,969) in view of Pevere et al., '002, Wright '737 or Goodhart '836.

Yue et al. teaches a vertical well 4 used to form a high-permeability web 6 at the bottom of the reservoir using a microwave antenna 7. Four horizontal wells 11 can extend from the vertical well 4 and each can have a web emanating therefrom. (Column 5, lines 26-30 and 65-67.) In another version, high permeability webs are applied to laterally and vertically staggered horizontal wells as shown in Fig. 6. However, Yue et al. does not teach forming a permeable zone comprising (i) a first patterned web of channels radiating outwardly from an outlet of an injection well bore, the channels extending downwardly into the subterranean reservoir at an angle of at least about 5 degrees, and (ii) a second patterned web of channels radiating outwardly from an inlet of a production well bore and located below, or connected to, the first patterned web of channels.

Willman teaches drilling an access shaft 3 and two radial arrays of substantially horizontal wells 6 out from the shaft, one array of wells being substantially shorter than the other. (Column 5, lines 41-63.) Willman does not teach forming a permeable zone comprising (i) a first patterned web of channels radiating outwardly from an outlet of an injection well bore, the channels extending downwardly into the subterranean reservoir at an angle of at least about 5 degrees, and (ii) a second patterned web of channels radiating outwardly from an inlet of a production well bore and located below, or connected to, the first patterned web of channels.

Pevere et al. teaches a drilled shaft or borehole 11 with pilings extending therefrom and with a production tubing 16 in the shaft 11. (Column 2, lines 15-30.) Pevere et al. does not make up for the deficiencies of Yue et al. or Willman, because Pevere et al. does not teach forming a permeable zone comprising first and second

patterned webs of channels radiating outwardly from the outlet of an injection well bore, and from the inlet of the production well bore, respectively. Thus, Yue et al. or Willman in view of Pevere et al. do not render obvious claim 17 or the claims dependent therefrom.

Wright teaches an oil well comprising an aperture 1 to a chamber 2 from which extends upwardly inclined channels 5. (Lines 77-104.) However, Wright also does not make up for the deficiencies of Yue et al. or Willman, because Wright does not teach forming a permeable zone comprising a first patterned web of channels radiating outwardly from the outlet of the injection well bore, and a second patterned web of channels radiating outwardly from the inlet of the production well bore and located about the first patterned web of channels. Thus, Yue et al. or Willman in view of Wright do not render obvious claim 17 or the claims dependent therefrom.

Goodhart teaches various versions, including a well comprising a central shaft 200 having multiple upwardly deviated holes 10D and one or more outer loop boreholes 202 as shown in Fig. 12, and another comprising a vertical shaft 400 connected to upwardly deviated holes 10D and deviated outer boreholes 410 as shown in Fig. 13. However, Goodhart does not make up for the deficiencies of Yue et al. or Willman, because Goodhart also does not teach a permeable zone comprising a first patterned web of channels radiating outwardly from the outlet of the injection well bore, and a second patterned web of channels radiating outwardly from the inlet of the production well bore and located below, or connected to, the first patterned web of channels. Thus Yue et al. or Willman in view of Goodhart do not render obvious claim 17 or the claims dependent therefrom.

Thus, Ye et al. or Willman in view of Pevere et al., Wright or Goodhart do not render claim 17, or the claims dependent therefrom, obvious under Section 103(a).

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